Utility MACT Working Group

Hg: Accounting for Variation/Error

OAQPS/ESD
July 9, 2002
Data

- 80 plants
- 3 runs
- 240 data points
Analysis

- Used SAS VARCOMP (Variance Component) procedure
- Analyzed the following model

\[ Y_{ij} = \mu + F_i + P_j + e_{ijk} \]
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Where
- \( Y_{ij} \) is the observation for the \( j \)th plant using the \( i \)th fuel for the \( k \)th run
- \( \mu \) is the overall mean,
- \( F \) is a fixed effect for the fuel type (e.g. lignite)
- \( P \) is a random effect due to a plant,
- \( e \) is an error term with all remaining sources of variation
Results

- Variance component due to plants
  - 45.94
- Variance component due to error
  - 13.29
Application

- Variance due to plant for a 3-run mean
  - 19.74
- Variance due to error for a 3-run mean
  - 4.44
- T-values for 90, 95, and 99 percent, one-tailed confidence interval
  - 1.2816
  - 1.645
  - 3.323
Mean of best 12% for each fuel type
- Bituminous 0.087
- Sub-bituminous 0.724
- Lignite 2.251
Application (cont.)

Limit will be a one-sided confidence interval of the means of the best 12% percent for each fuel type

\[ \text{Limit} = \bar{X}_{\text{best 12\% for fuel}} + T_{\alpha, df > 30} \cdot S \]

\[ S = \sqrt{S^2_{\text{plant}} + S^2_{\text{error}}} \]
## Application (cont.)

- Resulting potential floor levels that incorporate variability (lb/TBtu)

<table>
<thead>
<tr>
<th>Fuel</th>
<th>90% limit</th>
<th>95% limit</th>
<th>99% limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bituminous</td>
<td>5.782</td>
<td>7.397</td>
<td>10.409</td>
</tr>
<tr>
<td>Sub-bituminous</td>
<td>6.419</td>
<td>8.034</td>
<td>11.046</td>
</tr>
<tr>
<td>Lignite</td>
<td>7.946</td>
<td>9.561</td>
<td>12.573</td>
</tr>
</tbody>
</table>